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IMPLEMENTATION OF COMPUTER GAMES ELEMENTS INTO THE VIRTUAL EDUCATIONAL ENVIRONMENT

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ABSTRACT

The present paper focuses on the approach, which corresponds to the virtual learning in the artificial environment, and should be considered as situational and action-based, because the features of its application are determined each time by the specific conditions of training and the virtual educational situation that exists only in this area, at this time, between specific subjects and objects of education. The objective of the study is to determine possible ways of university learning process optimization. This paper is a preliminary attempt to show that integration of educational game elements to virtual learning environments will help students to reach educational goals in the process of study and familiarize with the norms and values of society.

KEYWORDS

Virtual Educational Environment, Situated Learning, Computer Games

1. INTRODUCTION

The long-term memory of every person on our planet stores the wonderful time of his/her childhood – the house (might be huge or small), the milk (might be very hot or cold), but the games were always amazing. Games which are still stored in the adults' or teenagers' memory as something ready-to-order and causing interest when applied in the university training process of young people who are in the age of 17-23, is evoking the interest of the participants by their interactivity, by their clarity, and thereby contributes to the motivation of the participants in the game to gain knowledge. The childhood memories are awoken on a subconscious level and the person perceives the learning process itself as a kind of activity that causes interest and is worth to be engaged in. As a result we can conclude that positive emotions in the process of educational or learning game can make the learning opportunities created by teaching situations more effective to every student (Kim &Lee, 2012, Romero et al., 2012) as well as serious game environment can promote learning and motivation, providing it includes features that prompt learners to process the educational content actively. (Erhel & Jamet, 2013).

2. EVOLUTION STEPS – FROM TABLETOP GAMES TO VIRTUAL WORLDS

Traditionally games were something like a competition. For every competition it is necessary to have a goal, a partner, and a special place. From time immemorial the classification of games was wide. They were divided according to the number of players (two-and multiplayer), the location where the game took place (indoor – *like tabletop games*/outdoor *like sport or party games for adults or children*) etc. But technological revolution brought the humanity different types of entertainment machines, so it became possible to define 1970th as an era of game machines – pinball, football, arcade games (in coin-operated automates, developed for entertainment). The appearance of electro-mechanical games introduced the beginning of light-gun (*Duck Hunt, Wild Gunman*) and racing (G*rand Prix*) games. Some of these games were even half-educational, e.g. electro-mechanical game *Periscope*, an early submarine simulator or *Jet Rocket*, a combat flight simulator). To replace the arcade games has appeared video games with gaming consoles and

joysticks, popular in 80th (*Spacewar, Pong, Space Invaders*). Being used usually in restaurants, bars or cinemas, these games had nothing in common with education as well as action/fighting games (like *Heavyweight Champ, Street Fighter)* on video games consoles. At the beginning of the 21st century appeared PC games and later - virtual reality games that were initially conceived as entertainment for children (sometimes with elements of acquaintance with the environment or social life habits and mastering some social skills) and adults (e.g. World of Tanks).

Sometimes video and PC games were used to support the school curriculum. But the researchers had found some evidence for the effects of video games only on language learning, history, and physical education, but little support for the academic value of video games in science and math. (Young, Slota, Cutter, 2012).

2.1 Games and Education in the 21st century

When the technical difficulties of creating PC video games and virtual worlds were overcome, scientists, noticing their obvious advantages for further application in the educational process, began an active discussion of this topic. The existed innovative for that time) technologies did not involve necessarily pedagogical innovations; it was required to design new learning environments using pedagogical approaches to maximize learning outcomes (Fowler, 2015).

A lot of researchers began to search teaching tools that will not only help the teacher to compensate for the time deficit and material base but also will be able to launch the professional and creative potential of each individual student in all disciplines. It was determined that real learning should be contextual, immersive, all-embracing, and interactive, i.e. when students can directly apply it in authentic activities, contexts, and cultures. The task was to develop multipurpose, on-line, all-inclusive means for education (including self-education) on the basis of system approach for forming some perfect level of social/professional readiness. Educational computer games were adopted as a basis for the development of effective and motivational learning environments, in which students are stimulated to carry out various educational tasks and activities, environments that give students opportunity to express themselves, regardless of gender (Papastergiou, 2009), race, nationality, religion. Moreover, these learning environments should develop and the enhance intercultural communicative competence of the students (Guillen-Nieto & Aleson-Carbonell, 2012). So, the solution was found in the form of virtual learning environments.

2.2 Virtual Learning Environment – Digital Age in Education

The next decade is likely to witness how virtual or online personal learning environments, described as the platforms where task-oriented creativity, direct problem-solving, interactive communication and fruitful collaboration of participants, visible experimentation, and task-oriented inquiry will become the preferred form of information technologies application in education. On the other hand, a virtual learning environment is a software program that provides web-based tools, services, and resources so as to deliver track and manage teaching and learning processes for both online and blended delivery (Weller, 2007; Reese, 2015). Essential features of the "virtual learning environment" concept include:

1) Academic content and pedagogical activities that are delivered and performed in an interactive form (Miller, R., Looney, J. and Wynn, J., 2010);

2) Flexible interface and information structures that satisfy educational requirements;

3) Special didactic tools for formation, implementation, and adjustment of acquired academic knowledge and practical skills;

5) Suitable tools which ensure the flow of the learning process on the base of action-based approach and learner-centered design principles;

6) Tools for assessment.

Any virtual learning environment which is used in the educational process should have the following fundamental properties:

1) To give the student the role of the object who manage his learning process (the student has to modulate the training system, forming context and activity components);

2) To require from the student strong academic self-concept, self-conscious, and active learning activities (in case of not following this requirement, the student cannot go to a higher degree of learning and to change the surface of acquired knowledge) (Baidak, Vereitina 2016).

The virtual learning environment created without complying with the basic didactic principles, become a one-off game for kids or adults and will promote neither to education nor to self-education of students. Organization of educational material in a virtual educational environment should contribute first and foremost a complete assimilation of each student in accordance with his individual abilities and individual pace of mastering the material under study and recognition of the specific subject content. The main result of the work in a virtual learning environment conditions should be aware for independent work and readiness for self-diagnosis (Vereitina, Baidak, 2016).

Virtual Learning Environment is a holistic educational system of computerized (programmable) student-centered learning, adapted to the needs of the student. At the same time each individual student, depending on his/her knowledge and skills at this particular stage of training, is provided with psycho-pedagogical tools to clarify learning goals, forming an individual program of educational activity, select the desired variant or level at which a subject matter is studied that, in general, meets the requirements of the European credit transfer accumulation system (ECTS). The main purpose of the implementation of the virtual learning environment into the educational process is the formation of independent cognitive activity of students, as well as the development of the creative person of the XXI century, possessing mega-cognitive skills and readiness for self-education.

But in the process of virtual learning environment creation with regard to pedagogical point of view, there is still much room for improvement in the effectiveness of these systems (Solorzano, 2013). One of such gap is a question – what games should be used in 'digital' education?

2.3 Digital Games and their Usage in the Training Process

Reasoning about games and their usage in the training process when learning foreign languages, leads us to the Situated Learning theory, as a general theory of knowledge acquisition (Lave, 1990) related to Vygotsky's notion of learning through social development (Vygotsky,1978) and Action-based approach which is nominated as the main in Common European Framework of Reference for Languages.

In traditional training process situated learning involves students in cooperative activities where they are challenged to use their critical thinking and kinesthetic abilities. These activities should be applicable and transferable to students' homes, communities, and workplaces (Stein, 1998). While immersed in the experience, students reflect on previously held knowledge and by challenging the assumptions of other students. Virtual learning environments based on the principles of situated learning place students in authentic learning situations where they are actively immersed in an activity while using problem-solving (critical thinking) skills. Implementation of game elements, explanation images, poems, songs, audio-and video-records, interactive content, streamed and recorded presentations, and tests for self-assessment will noticeably enhance the educational process. These opportunities should involve a social community which replicates real-world situations. Finally, the situated learning experience should encourage students to tap their prior knowledge and to challenge others in their community (Stein, 1998, para. 3). In other words, previously acquired knowledge and obtained skills play the basic role in such type of education. The drawback is in the following – if you don't have any knowledge, you are not a player in this platform. But there is also a benefit –situated learning suggests that learning occurs through the activities that imply relationships between people and integration of prior and authentic knowledge. So, according to Herrington and Oliver, 2000, situated learning should:

1. provide authentic context that reflects the way the knowledge will be used in real-life;
2. provide authentic activities;
3. provide access to expert performances and the modeling of processes;
4. provide multiple roles and perspectives;
5. promote reflection to enable abstractions to be formed;

6. promote articulation to enable tacit knowledge to be made explicit;
7. provide for integrated assessment of learning within the tasks;
8. support collaborative construction of knowledge;
9. provide coaching and scaffolding at critical times.

The action-based approach is found on the idea of the cognizing object activity, and learning as an active, conscious, creative activity which takes into consideration cognitive, emotional and volitional resources of the human brain. This approach will help the student to evolve such generally-or professionally-oriented study skills as

• maintaining attention to the presented information;
• grasping the intention of the task set;
• co-operating effectively in pair and group work;
• making rapid and frequent active use of the knowledge learned;
• ability to use available materials for independent learning (self-study).

3. RESULTS AND DISCUSSION

3.1 Gamification of Activity in Educational Environment for Language Students

All the skills discussed in the previous part correlate with didactic aims of game-organization activity: expansion of horizons; amplification of cognitive activity; formation of certain professional skills (in case of role-plays or simulations); upbringing of self-sufficiency, stress control, self-regulation; extension of education in cooperation, teamwork; training of communication skills; germination of attention, memory, speech, thinking; accomplishment of ability to compare, classify, generalize; elaboration of creativity; enhancement of motivation for learning activities; familiarization with the norms and values of society; adaptation to the environment.

Computer games (intended for education) have the same goals and elements as traditional but wider scope. Depending on the didactic goal of the game, the didactic task is determined, which is carried out throughout the game through the implementation of game actions. The presence of a didactic task, which is a key element of the learning game, contributes to a higher efficiency of the game. Such a task can be, for example, 'the consolidation of knowledge obtained in previous studies'. Therefore, when developing tasks in the game form intended for inclusion in a computer educational environment, it is necessary to determine in advance which didactic tasks will be implemented.

In case of integration of generally-or professionally-oriented contents and foreign language learning, we can add the ability to make effective use of linguistic (lexical, grammatical, semantic, phonological, orthographic, orthoepic) competences. (Common European Framework of Reference for Languages: Learning, Teaching, Assessment).

So, let's consider the above-mentioned didactic task on the example of the exercise from the interactive learning environment for language students. The traditional task is very simple: "*Translate the following collocations"*. The code of exercise (Fig.1) in the program is the following:

[1#to change the world][2#essential to life][3#to move and decay][4#atmospheric composition changes][5#developing ecosystems][6#to release into atmosphere][7#to decay the energy balance] [8#to change the climate and weather][9#to poison the environment][10#products of human activity][11#to require energy balance][12#high-potential source]|. The general view of the exercise in the program is shown on Figure 1.

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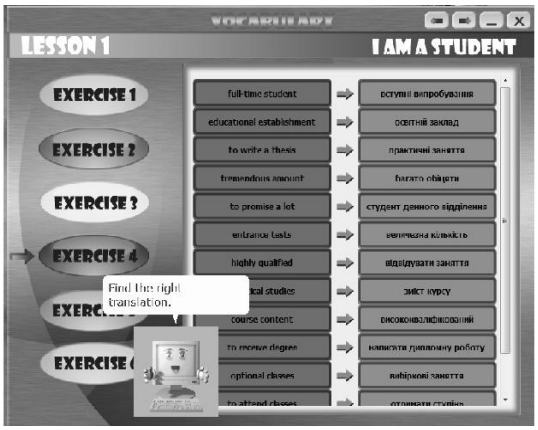

Figure1. The interface of the exercise (1)

We can make this task a more powerful learning tool by its gamification. If after each right answer students will hear the word-combinations pronounced correctly or short rhyme/poem/song with it, the interactive animation, short video or even visualization of the word-combination will appear on the screen, the motivation of students for performing the exercise will be twice higher.

If the simple interface will be changed (e.g. lead the ship (English word) to the right pier (translation)) the exercise becomes more fun and accessible.

The next essential element of the educational game is the game instruction and pattern. These rules should have educational and organizational character, revealing the way of game actions and organizing the cognitive activity. Sometimes game instruction should include additional data (in case of gaps in previously acquired knowledge), necessary for performing this or that exercise or activity without any problems.

If we take the exercise with the traditional instruction like "*Fill in each space with one letter to create words",* additional data in the form of images with these words and perfect explanation of them should be given on the screen. The instruction may be changed to "Word-play. Do you recognize the words? Try to fill in the missing letters and read the words aloud. Consult with the image". While the student is performing this task, the words may change color or even disappear, or turn into a picture.

The code of exercise (Figure 2) in the program is the following:
|c#h#a#n#ge|e#n#v#i#r#o#n#m#e#nt|e#s#s#e#n#t#i#al|m#o#ve|s#o#u#r#ce|s#t#o#re|c#o#m#p#o#se|f#o#r#ce|d#e#c#ay|d#e#v#e#l#op|r#e#q#u#i#re|r#e#l#e#a#se|;

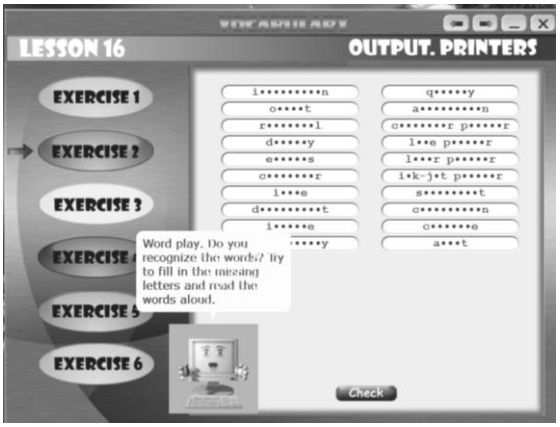

Figure 2. General interface of the exercise (2)

Exercises like *"Pick up to every word explanation from the given below to make the mini-glossary. It's really interesting to know whether you remember these very terms or not"* provide authentic context that reflects the way the knowledge will be used in real-life (situation learning) and turn us to action-based approach (see the skills given above).

The code of exercise in the program is the following:
|1.#niche|2.#predator|3.#environment|4.#consumer|5.#population|6.#trophic level|7.#decomposer|
8.#habitat|;|4.#group of the same kind of organism living in a certain place.|3.#animal that hunts and eats other animals.|2.#everything that surrounds a living thing|8.#Those organisms which consume living organisms to obtain nourishment.|1.#It's made up of individuals of the same species that share the same habitat at the same time.|6.#hierarchy of consumers|5.#organism that breaks down the wastes or remains of other organisms|7.#place where an organism lives|;

Such exercises with future role-play help students to make rapid and active use of the knowledge learned in the courses of other disciplines (e.g. 'Fundamentals of Ecology'). The students are judged on an individual score.

A 5-year experiment on the inclusion of game elements to computer-based learning environment "My Amazing Ecoland" for the study of professionally-oriented foreign language for students of the faculty of Ecology showed a significant (75%) increase in the percentage of the quality of knowledge.

4. CONCLUSION

The evidence from this study implies that approach, which corresponds to the virtual learning in the artificial environment, should be considered as situational and action-based, because the features of its application are determined each time by the specific conditions of training and that virtual educational situation that exists only in this area, at this time, between specific subjects and objects of education. Such approach, in case of integration of educational game elements, will help students to expand the ranges of their knowledge, to amplify cognitive activity (germination of attention, memory, speech, thinking), to form professional skills, to widen abilities to use available materials for life-long learning (educational goals); to familiarize with the norms and values of society, to expand possibilities in the process of education in cooperation through the teamwork; to train communication skills, to bring up self-sufficiency, stress control, self-regulation (upbringing goals). The educational game elements implemented to virtual learning environment provide students' success, interest and motivation in the process of learning not only in virtual but also help them later, in the communication process in the real life. Multiple learning tasks help to emphasize the effect of training using such technologies due to the active position of the student. There is also the possibility of applying the obtained knowledge in various life situations.

The present findings might help to solve some problems of specialized approaches and didactics for development of effective tools for education computer-based learning environments, in particular, for students learning foreign languages.

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